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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,817	10/12/2001	Masaharu Muramatsu	046124-5099	8262

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EXAMINER

LEWIS, MONICA

ART UNIT PAPER NUMBER

2822

DATE MAILED: 10/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/974,817

Applicant(s)

MURAMATSU, MASA HARU

Examiner

Monica Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is in response to the amendment filed July 31, 2002.

Response to Arguments

2. Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
4. The abstract of the disclosure is objected to because it appears that "substrate 21 :" is an error. Correction is required. See MPEP § 608.01(b).
5. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Drawings

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: a) 21b (See Figure 1); and b) 55 (See Figure 8). A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

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7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because of the following: a) reference character "12" has been used to designate both photosensitive regions and thin shape section (See Page 5 Line 18 and Page 7 Lines 1 and 2); b) reference character "22" has been used to designate both photosensitive regions and InGaAs photodiode unit (See Page 5 Line 18 and Page 10 Line 18); and c) reference character "23" has been used to designate both conversion regions and second cells (See Page 11 Lines 7 and 11). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

8. Figure 10 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

9. A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what is meant by the following: a) "respective fronts of said first back illuminated semiconductor image pick-up element and said second semiconductor image pickup element are closer to each other than their respective backs" (See Claim 1); "is disposed" (See Claim 3). Claims 2-10, depend directly or indirectly from a rejected claim and are, therefore, also rejected under 35 U.S.C. 112, second paragraph for the reasons set above.

12. Claim 9 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not disclose that the substrate contains the same material as the second semiconductor image pickup element.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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14. Claims 1, 2 and 5-9, as far as understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Jack et al. (U.S. Patent No. 5,808,350).

In regards to claim 1, Jack et al. ("Jack") discloses the following:

a) a first back-illuminated semiconductor image pickup element (12) having a front and a back and a first photosensitive region which is closer to said front than said back thereof (See Figure 1A);

b) a second semiconductor image pickup element (16) also having a front and a back and a second photosensitive region which is closer to said front than back thereof, said second semiconductor image pickup element being made of a semiconductor material different from that of said first back-illuminated semiconductor image pickup element (See Figure 1A);and

c) first back-illuminated semiconductor image pickup element and said second semiconductor image pickup element are secured such that respective fronts of said first back illuminated semiconductor image pick-up element and said second semiconductor image pickup element are closer to each other than their respective backs (See Figure 1A).

In regards to claim 2, Jack discloses the following:

a) mutually opposite faces of said first back- illuminated semiconductor image pickup element and said second semiconductor image pickup element are adhered via a resin (14) (See Figure 1A).

In regards to claim 5, Jack discloses the following:

a) first back-illuminated semiconductor image pickup element contains Si (See Abstract).

In regards to claim 6, Jack discloses the following:

a) second semiconductor image pickup element contains a compound semiconductor (See Abstract).

In regards to claim 7, Jack discloses the following:

a) compound semiconductor includes InGaAs (See Abstract).

In regards to claim 8, Jack discloses the following:

a) a cooler is in contact with a face of the second semiconductor image pickup element on the opposite side to said first back-illuminated semiconductor image pickup element (See Figure 3).

In regards to claim 9, Jack discloses the following:

a) first back-illuminated semiconductor image pickup element and said second semiconductor image pickup element partly overlap and that a substrate containing the same material as said second semiconductor image pickup element is contacted with a region at said first back-illuminated semiconductor image pickup element which does not overlap said second semiconductor image pickup element (See Column 4 Lines 4-7 and Column 8 Line 40).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 3 and 10, as far as understood, are rejected under 35 U.S.C. 103(a) as obvious over Jack et al. (U.S. Patent No. 5,808,350) in view of Go (U.S. Patent No. 4,912,545).

In regards to claim 3, Jack discloses the following:

a) a first back-illuminated semiconductor image pickup element (See Figure 1A);

b) a second semiconductor image pickup element made of a semiconductor material different from that of said first back illuminated semiconductor image pickup element (See Figure 1A); and

c) first back-illuminated semiconductor image pickup element is disposed such that respective photosensitive regions of said first back-illuminated semiconductor image pickup element and said second semiconductor image pickup element are adjacent to each other (See Figure 1A).

In regards to claim 3, Jack fails to disclose the following:

a) mutually opposite faces of said first back-illuminated semiconductor image pickup element and said second semiconductor image pickup element are adhered via at least three or more bumps.

However, Go discloses the use of bumps (See Figure 1A, Figure 1B and Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Jack to include bumps as disclosed in Go because it aids in providing an electrical connection among the components.

In regards to claim 10, Jack fails to disclose the following:

a) mutually opposite faces of said first back-illuminated semiconductor image pickup element and said second semiconductor image pickup element are adhered via at least three or more bumps.

However, Go discloses the use of bumps (See Figure 1A, Figure 1B and Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Jack to include bumps as disclosed in Go because it aids in providing an electrical connection among the components.

17. Claim 4, as far as understood, is rejected under 35 U.S.C. 103(a) as obvious over Jack et al. (U.S. Patent No. 5,808,350) in view of Go (U.S. Patent No. 4,912,545) and Erhardt et al. (U.S. Patent No. 5,070,380).

In regards to claim 4, Jack discloses the following:

a) a first back-illuminated semiconductor image pickup element (See Figure 1A).

In regards to claim 4, Jack fails to disclose the following:

a) shift register.

However, Erhardt et al. ("Erhardt") discloses the use of a shift register (20) (See Figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Jack to include a shift register as disclosed in Erhardt because it aids in transferring the charge carriers.

a) shift register is electrically connected via said bumps to said second semiconductor image pickup element, and that a signal from said second semiconductor image pickup element is read by driving said shift register.

However, Go discloses the use of bumps (See Figure 1A, Figure 1B and Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Jack to include bumps as disclosed in Go because it aids in providing an electrical connection among the components.

Conclusion

18. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: a) Liu (U.S. Patent No. 4,422,091) discloses a backside illuminated imaging charge coupled device; b) Savoye (U.S. Patent No. 4,656,519) discloses a back-illuminated ccd imager; c) Gluck et al. (U.S. Patent No. 5,227,313) discloses a process for making backside illuminated image sensors; d) Yanka et al. (U.S. Patent No. 5,512,750) discloses a dual band sensor; e) Wadsworth et al. (U.S. Patent No. 5,652,250) discloses a hybrid ccd imaging; and f) Burke et al. (U.S. Patent No. 5,904,495) discloses an interconnection technique for hybrid integrated devices.

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19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 703-305-3743.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML

October 14, 2002



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